JW7809

500mA, Low-Dropout High-PSRR, Ultra-Low-Noise, LDO

DESCRIPTION

The JW7809 is a low noise low-dropout (LDO) voltage regulator with enable function that operates from 2.2V to 6V. It provides up to 500mA of output current. The feature of low noise and high PSRR makes this device ideal for RF and analog systems.

JW7809 supports output voltage from 1.2V to 4.5V in 25mV steps.

JW7809 guarantees robustness with output short-circuit protection, input under voltage lockout protection and over temperature protection.

JW7809 is available in SOT23-5, X2DFN1*1-4 and EWDFN2*2-6 packages.

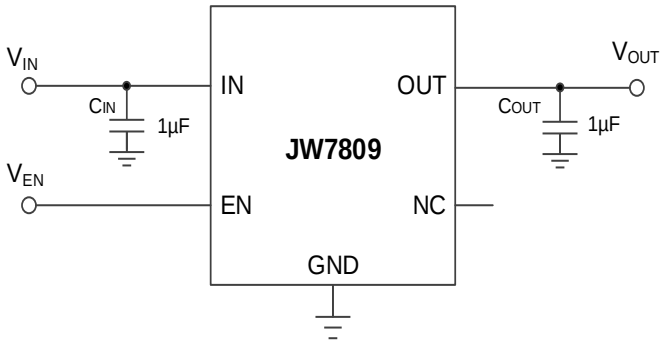
FEATURES

- Input Voltage Range: 2.2V to 6V
- Output Voltage Range: 1.2V to 4.5V
- Output Current: 500mA
- Output Voltage Accuracy: ±2.5%
- Low I_Q(Enabled): 11μA
- PSRR: 82dB @1kHz
- Low Output Voltage Noise: 12μV_{RMS}
- Stable with 1μF Effective Output Capacitance
- Remote Output Capacitor Placement
- No Noise Bypass Capacitor Required
- Current Limit Protection
- Over Temperature Protection
- Available in SOT23-5, X2DFN1*1-4, EWDFN2*2-6 Packages

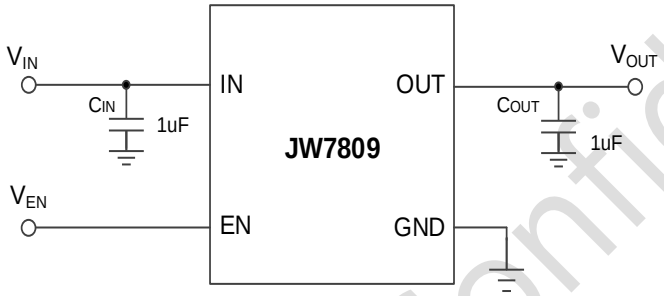
APPLICATIONS

- ADAS Cameras and Radar
- ADAS Domain Controller
- Cockpit Domain Controller
- Telematics System

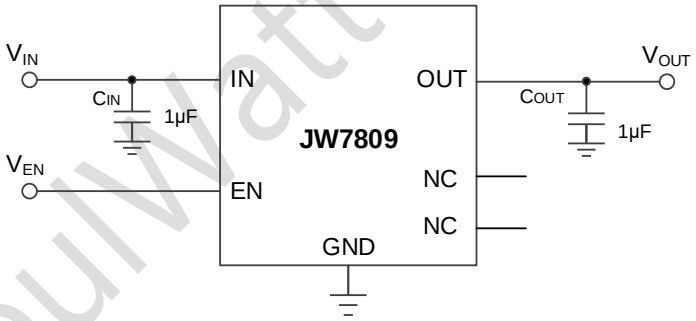
TYPICAL APPLICATION



SOT23-5



X2DFN1*1-4



EWDFN2*2-6

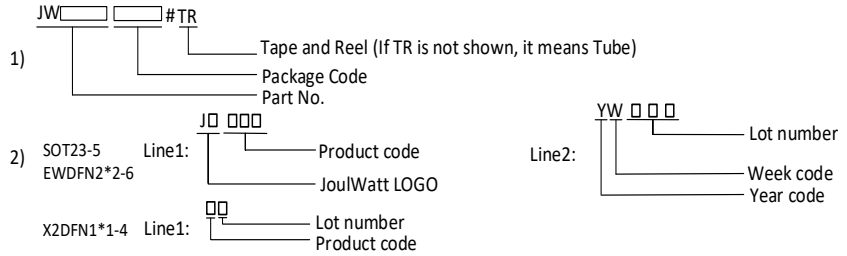
ORDER INFORMATION

DEVICE[1)]	PACKAGE	TOP MARKING[2)]	ENVIRONMENTAL[3)]
JW7809-1.2SOTA#TR	SOT23-5	JADA□ YW□□□	Green
JW7809-1.5SOTA#TR	SOT23-5	JADB□ YW□□□	Green
JW7809-1.8SOTA#TR	SOT23-5	JADC□ YW□□□	Green
JW7809-2.5SOTA#TR	SOT23-5	JADD□ YW□□□	Green
JW7809-2.8SOTA#TR	SOT23-5	JADE□ YW□□□	Green
JW7809-2.85SOTA#TR	SOT23-5	JADF□ YW□□□	Green
JW7809-2.9SOTA#TR	SOT23-5	JADG□ YW□□□	Green
JW7809-3.0SOTA#TR	SOT23-5	JADH□ YW□□□	Green
JW7809-3.1SOTA#TR	SOT23-5	JADJ□ YW□□□	Green
JW7809-3.2SOTA#TR	SOT23-5	JADK□ YW□□□	Green
JW7809-3.3SOTA#TR	SOT23-5	JADL□ YW□□□	Green
JW7809-4.0SOTA#TR	SOT23-5	JADM□ YW□□□	Green
JW7809-4.5SOTA#TR	SOT23-5	JADN□ YW□□□	Green
JW7809-1.2X2DHAB#TR	X2DFN1*1-4	4□	Green
JW7809-1.5X2DHAB#TR	X2DFN1*1-4	5□	Green
JW7809-1.8X2DHAB#TR	X2DFN1*1-4	6□	Green
JW7809-2.5X2DHAB#TR	X2DFN1*1-4	7□	Green

JW7809-2.8X2DHAB#TR	X2DFN1*1-4	8□	Green
JW7809-2.85X2DHAB#TR	X2DFN1*1-4	9□	Green
JW7809-2.9X2DHAB#TR	X2DFN1*1-4	A□	Green
JW7809-3.0X2DHAB#TR	X2DFN1*1-4	B□	Green
JW7809-3.1X2DHAB#TR	X2DFN1*1-4	C□	Green
JW7809-3.2X2DHAB#TR	X2DFN1*1-4	D□	Green
JW7809-3.3X2DHAB#TR	X2DFN1*1-4	E□	Green
JW7809-4.0X2DHAB#TR	X2DFN1*1-4	F□	Green
JW7809-4.5X2DHAB#TR	X2DFN1*1-4	G□	Green
JW7809-1.2EWDGBB#TR	EWDFN2*2-6	JADA□ YW□□□	Green
JW7809-1.5EWDGBB#TR	EWDFN2*2-6	JADB□ YW□□□	Green
JW7809-1.8EWDGBB#TR	EWDFN2*2-6	JADC□ YW□□□	Green
JW7809-2.5EWDGBB#TR	EWDFN2*2-6	JADD□ YW□□□	Green
JW7809-2.8EWDGBB#TR	EWDFN2*2-6	JADE□ YW□□□	Green
JW7809-2.85EWDGBB#TR	EWDFN2*2-6	JADF□ YW□□□	Green
JW7809-2.9EWDGBB#TR	EWDFN2*2-6	JADG□ YW□□□	Green
JW7809-3.0EWDGBB#TR	EWDFN2*2-6	JADH□ YW□□□	Green
JW7809-3.1EWDGBB#TR	EWDFN2*2-6	JADJ□ YW□□□	Green
JW7809-3.2EWDGBB#TR	EWDFN2*2-6	JADK□ YW□□□	Green

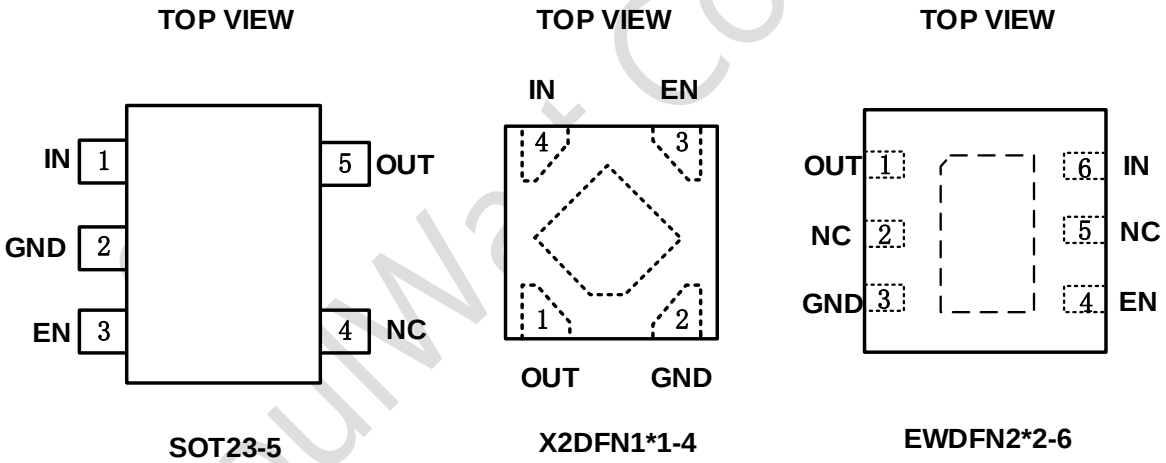
JW7809-3.3EWDGBB#TR	EWDFN2*2-6	JADL□ YW□□□	Green
JW7809-4.0EWDGBB#TR	EWDFN2*2-6	JADM□ YW□□□	Green
JW7809-4.5EWDGBB#TR	EWDFN2*2-6	JADN□ YW□□□	Green

Notes:



3) All JoulWatt products are packaged with Pb-free and Halogen-free materials and compliant to RoHS standards.

PIN CONFIGURATION



ABSOLUTE MAXIMUM RATING[1)]

IN, EN Pin ..... -0.3V to 7V
OUT Pin..... -0.3V to V_{IN}+0.3V[2)]
Junction Temperature[3)] 150ºC
Lead Temperature 260ºC
Storage Temperature ..... -65 ºC to 150ºC
ESD Susceptibility (Human Body Model).....±2kV
ESD Susceptibility (Charged Device Model).....±1kV
MSL (SOT23-5) MSL1
MSL (X2DFN1*1-4) MSL1
MSL (EWDFN2*2-6) MSL1
Continuous Power Dissipation(T_A=+25ºC) SOT23-5 ..... 0.78W
Continuous Power Dissipation(T_A=+25ºC) X2DFN1*1-4 ..... 0.61W
Continuous Power Dissipation(T_A=+25ºC) EWDFN2*2-6 ..... 1.4W

RECOMMENDED OPERATING CONDITIONS[4)]

Input Voltage V_{IN} ..... 2.2V to 6V
Output Current I_{OUT} ..... 0mA to 500mA
Junction Temperature Range ..... -40°C to 125°C

THERMAL PERFORMANCE[5)]

		SOT23-5	*X2DFN1*1-4*	*EWDFN2*2-6*
$R_{\theta JA}$	Junction-to-ambient thermal resistance	128	163.9	70.8 ºC/W
Ψ_{JT}	Junction-to-top characterization parameter	25.8	54.3	21.2 ºC/W
Ψ_{JB}	Junction-to-board characterization parameter	59.7	113.4	44.1 ºC/W
$R_{\theta JC(top)}$	Junction-to-case(top) thermal resistance	63	207.7	136.6 ºC/W
$R_{\theta JC(bot)}$	Junction-to-case(bottom) thermal resistance	NA	96.9	26.1 ºC/W
$R_{\theta JB}$	Junction-to-board thermal resistance	59.9	116	44.6 ºC/W

Notes:

1) Exceeding these ratings may damage the device. These stress ratings do not imply function operation of the device at other conditions beyond those indicated under RECOMMENDED OPERATING CONDITIONS.
2) The absolute maximum rating is V_{IN}+0.3V or 7V, whichever is smaller.
3) The JW7809 includes thermal protection that is intended to protect the device in overload conditions. Continuous operation over the specified absolute maximum operating junction temperature may damage the device.
4) The device is not guaranteed to function outside of its operating conditions.
5) Measured on JESD51-7, 4-layer PCB

ELECTRICAL CHARACTERISTICS

V_{IN}=$V_{OUT(NOM)}$+1V, V_{EN}=1.2V, I_{OUT}=1mA, C_{IN}=1μF, C_{OUT}=1μF, T_J=-40°C to 125°C, unless otherwise stated.

ITEM	SYMBOL	CONDITIONS	MIN.	TYP.	MAX.	UNIT
Input Voltage	V_{IN}	T_A=25°C	2.2		6	V
Input Supply UVLO	V_{UVLO}	V_{IN} rising		2	2.19	V
Input Supply UVLO Hysteresis	V_{HYS}			120		mV
Output Voltage Accuracy	$\triangle V_{OUT}$	V_{IN}=($V_{OUT(NOM)}$+1V) to 6V I_{OUT}=1mA to 500mA (V_{OUT}≥1.8V)	-2.5%		2.5%	V_{OUT}
		V_{IN}=($V_{OUT(NOM)}$+1V) to 6V I_{OUT}=1mA to 500mA (V_{OUT}<1.8V)	-3%		3%	
Line Regulation	$\triangle V_{OUT}/\triangle V_{IN}$	V_{IN}=($V_{OUT(NOM)}$+1V) to 6V I_{OUT}=1mA		0.2		mV/V
Load Regulation	$\triangle V_{OUT}/\triangle I_{LAOD}$	I_{OUT}=1mA to 500mA		0.04		mV/mA
Load Current	I_{LOAD}		0		500	mA
Quiescent Current	I_Q	V_{EN}=1.2V, I_{OUT}=0mA		11	25	μA
Ground Current	I_{GND}	V_{EN}=1.2V, I_{OUT}=0mA		12	25	μA
		V_{EN}=1.2V, I_{OUT}=500mA		200	360	μA
		V_{EN}=0.3V		0.2	1	μA
Dropout Voltage	V_{DO}	I_{OUT}=100mA		50	100	mV
		I_{OUT}=500mA		280	500	
Output Current Limit	I_{LIM}	2.2V ≤ V_{IN} ≤ 6V	505	800		mA
Short-Circuit Current Limit	I_{SC}	T_A=25°C		180		mA
Power-Supply Rejection Ratio[6)]	PSRR	f=100Hz, I_{OUT}=20mA		90		dB
		f=1kHz, I_{OUT}=20mA		82		
		f=10kHz, I_{OUT}=20mA		65		
		f=100kHz, I_{OUT}=20mA		60		
		f=1MHz, I_{OUT}=20mA		40		
Output Noise Voltage[6)]	V_{NO}	BW= 10Hz to 100kHz, I_{OUT}=1mA		14		μV_{RMS}
		BW= 10Hz to 100kHz, I_{OUT}=500mA		12		
Output Discharge Resistance	R_{PD}	V_{EN}=0V(Disabled)		300		Ω
EN Pin High-Level Input Voltage(Enable Device)	V_{ENH}		1.2			V
EN Pin Low-Level Input Voltage(Disable Device)	V_{ENL}				0.35	V

V_{IN}=$V_{OUT(NOM)}$+1V, V_{EN}=1.2V, I_{OUT}=1mA, C_{IN}=1μF, C_{OUT}=1μF, T_J=-40°C to 125°C, unless otherwise stated.						
ITEM	**SYMBOL**	**CONDITIONS**	**MIN.**	**TYP.**	**MAX.**	**UNIT**
EN Leakage Current	I_{EN_LKG}	V_{EN}=6V, V_{IN}=6V		1	1.5	μA
		V_{EN}=0V, V_{IN}=6V		0.001		
Turn On Time	t_{ON}	V_{EN}>V_{ENH} to V_{OUT}=95% of $V_{OUT(NOM)}$,V_{OUT}=3.3V		700		μs
Thermal Shutdown[6)]	T_{TSD}			160		°C
Thermal Shutdown Hysteresis[6)]	T_{TSD_HYST}			15		°C

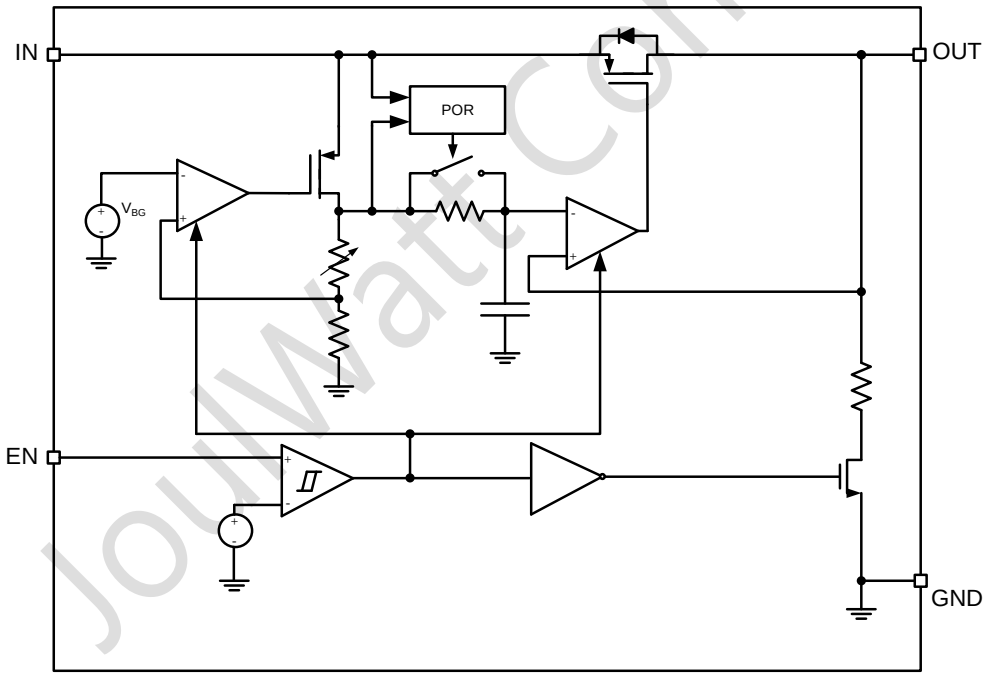
Note:

6) Guaranteed by design.

PIN DESCRIPTION

PIN			NAME	DESCRIPTION
EWDFN2*2-6	X2DFN1*1-4	SOT23-5		
1	1	5	OUT	Output of the regulator. A 1μF or larger output capacitor is recommended.
2	-	4	NC	Not connected.
3	2	2	GND	Ground.
4	3	3	EN	Enable input.
5	-	-	NC	Not connected.
6	4	1	IN	Supply voltage input. A 1μF or larger input capacitor is recommended.
Exposed Pad	-	-	-	The exposed pad should be connected to a large ground plane to maximize thermal performance.

BLOCK DIAGRAM

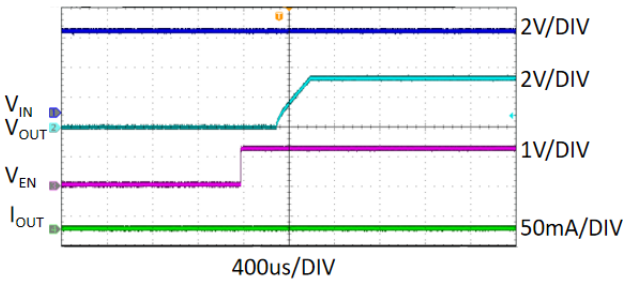


TYPICAL PERFORMANCE CHARACTERISTICS

V_{IN} = $V_{OUT(NOM)}$ + 1V (whichever is greater), $V_{OUT(NOM)}$ = 3.3V, V_{EN} = 1.2V, C_{IN} = 1μF, C_{OUT} = 1μF , I_{OUT} = 1mA, and T_A = 25°C, unless otherwise noted.

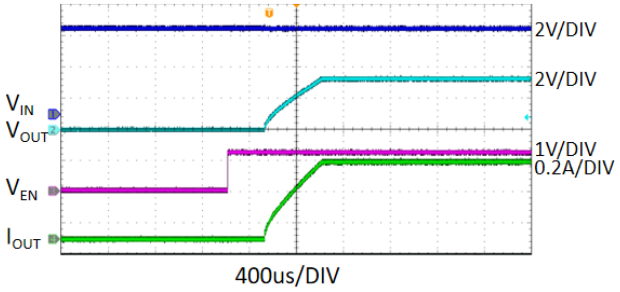
Start-Up

V_{IN}=5.5V, V_{OUT}=3.3V, I_{OUT} =1mA



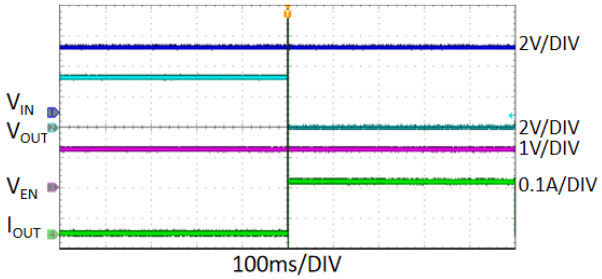
Start-Up

V_{IN}=5.5V, V_{OUT}=3.3V, I_{OUT} =500mA



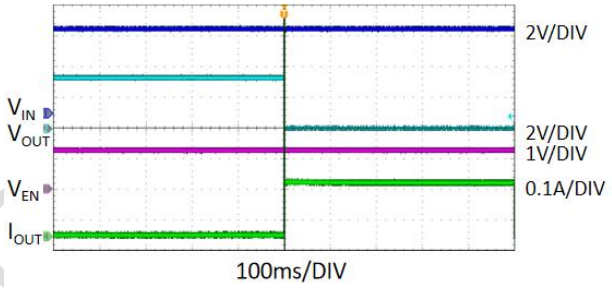
Short Circuit Protection

V_{IN}=4.3V, V_{OUT}=3.3V, I_{OUT} =0A to short



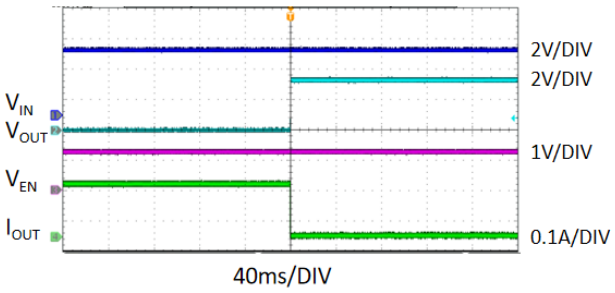
Short Circuit Protection

V_{IN}=5.5V, V_{OUT}=3.3V, I_{OUT} =0A to short



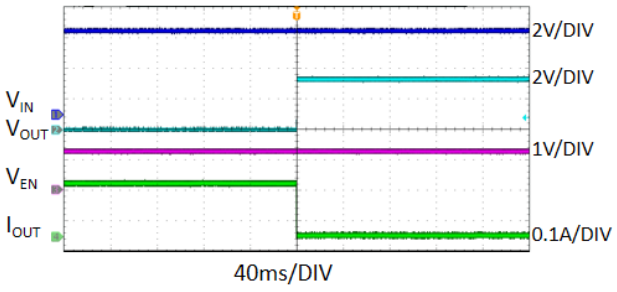
Short Circuit Recovery

V_{IN}=4.3V, V_{OUT}=3.3V



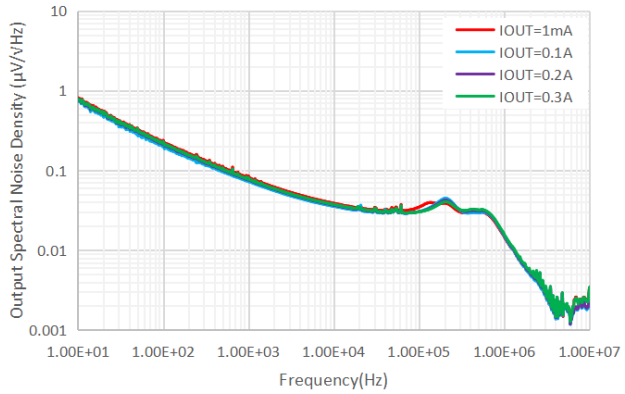
Short Circuit Recovery

V_{IN}=5.5V, V_{OUT}=3.3V



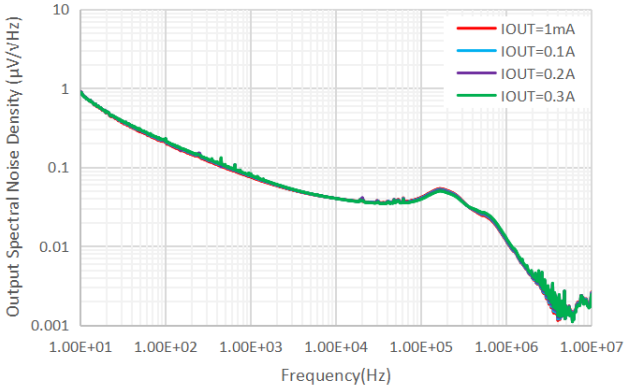
Output Spectral Noise Density vs Frequency

V_{IN} =2.2V, V_{OUT}=1.2V



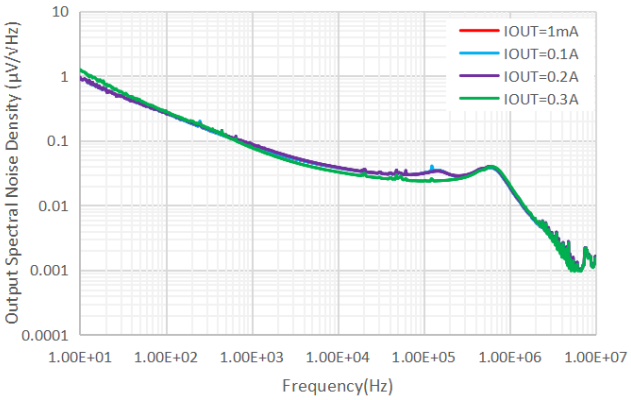
Output Spectral Noise Density vs Frequency

V_{IN} =2.8V, V_{OUT}=1.8V



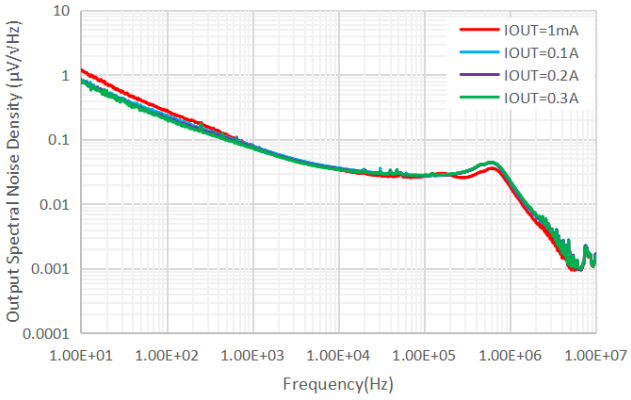
Output Spectral Noise Density vs Frequency

V_{IN} =3.8V, V_{OUT}=2.8V



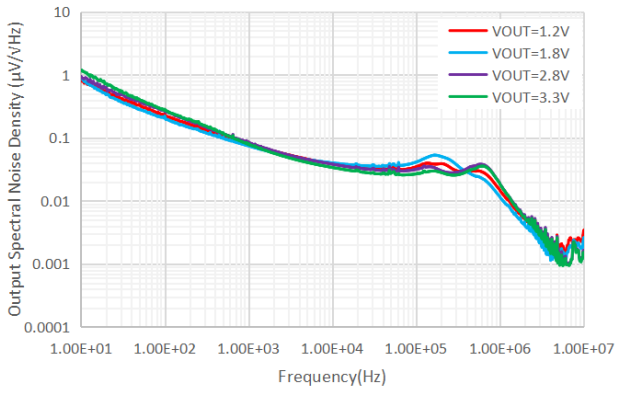
Output Spectral Noise Density vs Frequency

V_{IN} =4.3V, V_{OUT}=3.3V



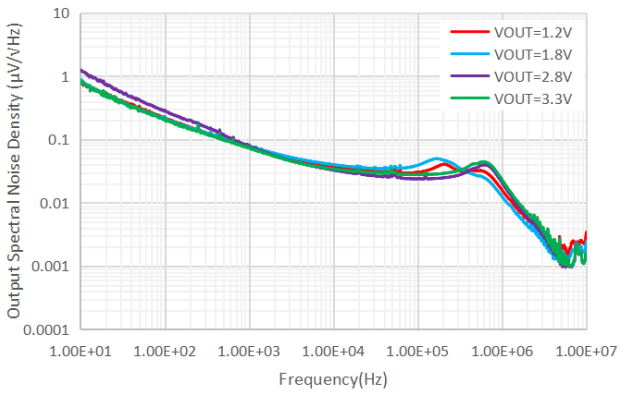
Output Spectral Noise Density vs Frequency

V_{IN} =V_{OUT}+1V,I_{OUT}=1mA



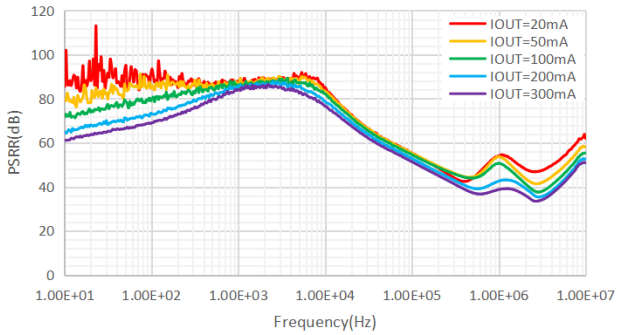
Output Spectral Noise Density vs Frequency

V_{IN} =V_{OUT}+1V,I_{OUT}=300mA



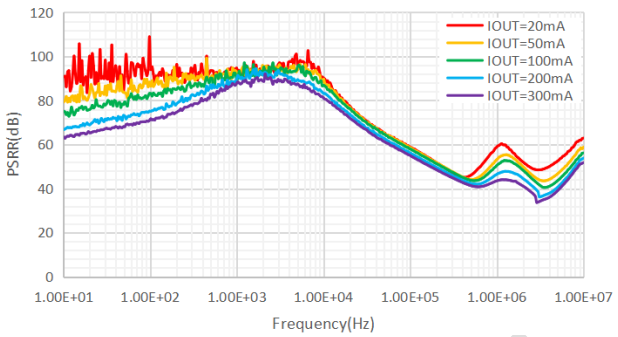
PSRR vs Frequency

V_{OUT}=1.2V, C_{IN}=NC, C_{OUT}=1μF



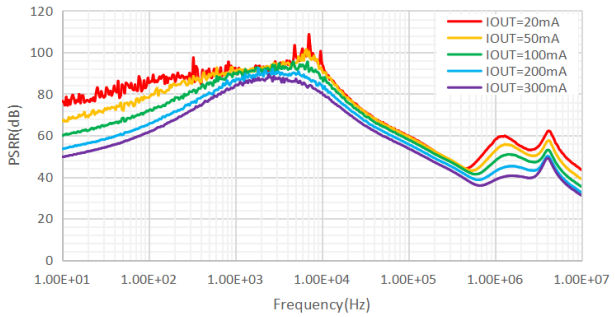
PSRR vs Frequency

V_{OUT}=1.8V, C_{IN}=NC, C_{OUT}=1μF



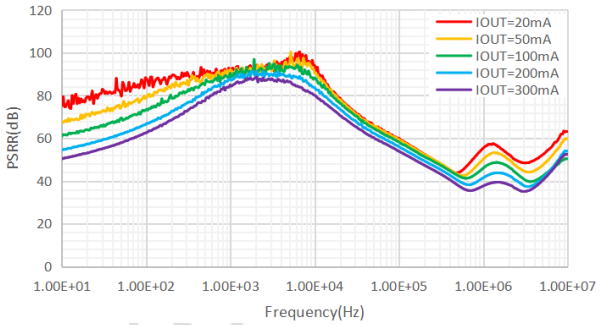
PSRR vs Frequency

V_{OUT}=2.8V, C_{IN}=NC, C_{OUT}=1μF



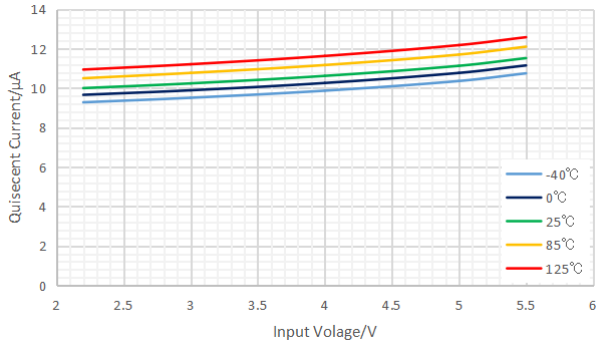
PSRR vs Frequency

V_{OUT}=3.3V, C_{IN}=NC, C_{OUT}=1μF



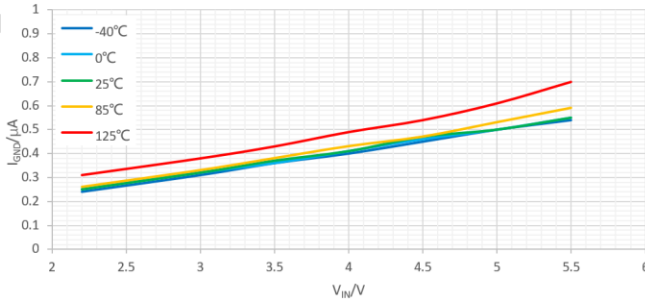
Quiescent vs Input Voltage

V_{EN}=1.2V



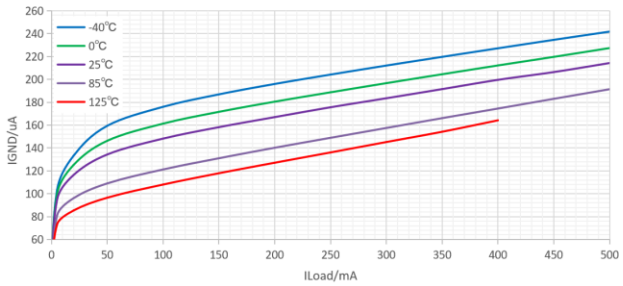
Ground vs Input Voltage

V_{EN}=0.3V



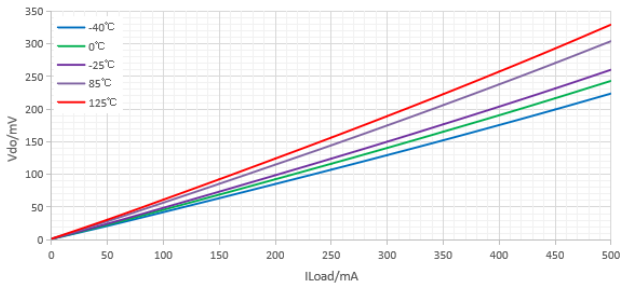
Ground Current vs Load Current

V_{IN}=4.3V,V_{EN}=1.2V



Dropout Voltage vs Load Current

V_{IN}=3.3V,V_{EN}=1.2V



FUNCTIONAL DESCRIPTION

The JW7809 is a low noise, low quiescent current linear regulator. The input voltage range is from 2.2V to 6V, and the output current is up to 500mA. The minimum required output capacitance for stable operation is 1μF effective capacitance after consideration of the temperature and voltage coefficient of the capacitor.

Output Transistor

The JW7809 builds in a P-MOSFET transistor which provides a low switch-on resistance for low dropout voltage applications.

Error Amplifier

The Error Amplifier (EA) compares the internal reference voltage V_{REF} with the output feedback voltage V_{FB} through the internal divider. Output of the error amplifier (EA) is used to control the gate voltage of P-MOSFET and ensures that the device provides good line and load regulation at output voltage.

Enable

The device is active when EN pin is set to high. For proper operation, this pin must be terminated and must not be left floating. With EN pin set to low, the device enters shutdown mode with less than 1μA current consumption.

Current Limit Protection

JW7809 provides current limit function to prevent the device from damages during the over load or shorted-circuit condition. The current is detected by a sensing transistor, which monitors and controls the pass transistor's gate voltage, limiting the output current to 800mA (TYP.). The PMOS pass transistor dissipates (V_{IN} – V_{OUT}) * I_{LIM} until thermal shutdown is triggered and the device turns off. When the device cools, the internal thermal shutdown circuit turns the device back on. If the fault condition continues, the device cycles between current limit and thermal shutdown. Current limit will fold back to 180mA when out is short to GND. The pass transistor conducts current when output voltage exceeds input voltage due to build in body diode. External protect circuit should be added if the device may work at reverse voltage state.

Output Discharge

The device provides automatic output voltage discharge once it is disabled. This feature prevents residual charge voltage on the output capacitor, which may impact proper power up of the system connected to the converter. The discharge circuit at V_{OUT} pin becomes active once the EN pin is pulled to low or the input voltage drops below UVLO comparator threshold.

Low Output Noise

Any internal noise at the JW7809 reference voltage is reduced by a first order low-pass RC filter before it is passed to the output buffer stage. The low-pass RC filter has a -3dB cut-off frequency of approximate 0.1Hz.

Thermal Protection

When the temperature of the JW7809 rises above 160°C, it is forced into thermal shutdown. Only when core temperature drops below 145°C can the device becomes active again.

APPLICATION INFORMATION

CIN and COUT Selection

The JW7809 is designed to support low ESR (Equivalent Series Resistance) ceramic capacitors. It is recommended to use ceramic capacitors (dielectric types X5R, X7R or COG) to obtain good stability across different temperatures. A better choice for temperature coefficient in a ceramic capacitor is X7R. This type of capacitor is the most stable and holds the capacitance within ±15% over the temperature range.

A typically 1μF or greater output ceramic capacitor is suggested. The output capacitor must meet the requirement for the minimum value of capacitance and have an ESR value that is within the range 5mΩ to 100 mΩ for stability. The initial tolerance, applied voltage de-rating, and temperature coefficient must all be considered when selecting the output capacitor to ensure the actual capacitance is never less than 1μF over the entire operating range.

Input capacitance is selected to minimize transient input drop during load current steps. For general applications, an input capacitor, typically 1μF, is highly recommended to minimize input impedance. If the trace parasitic inductance between the JW7809 input pin and power supply is high, a fast load transient can cause input voltage level ringing above the absolute maximum voltage rating which damages the device. Adding more input capacitors is available to restrict the ringing and keep it below the device absolute maximum ratings. Like the output capacitor, the initial tolerance, applied voltage de-rating, and temperature coefficient must all be considered when selecting the input capacitor to ensure the actual capacitance is never less than 1μF over the entire operating range.

Dropout Voltage

The JW7809 uses a PMOS to achieve low dropout. When (V_{IN} – V_{OUT}) is less than the dropout voltage (V_{DO}), the PMOS pass device is in its linear region of operation and the input-to-output resistance is the $R_{DS(ON)}$ of the PMOS. V_{DO} scales approximately with output current because the PMOS device in dropout behaves the same way as a resistor.

Power Dissipation and Device Operation

The permissible power dissipation for any package depends on the capability of the device passing heat from the power source, the junctions of the IC, to the ultimate heat sink, the ambient environment.

The maximum permissible power dissipation for the device in a given package can be calculated using Equation1:

$$P_{D-MAX} = (T_{J-MAX} - T_A)/R_{\theta JA}$$

Where the $T_{J-MAX} = 125^{\circ}C$

Power dissipation in the regulator depends on the input-to-output voltage difference and load conditions. P_D can be calculated by the following equation.

$$P_D = (V_{IN} - V_{OUT}) \times I_{OUT}$$

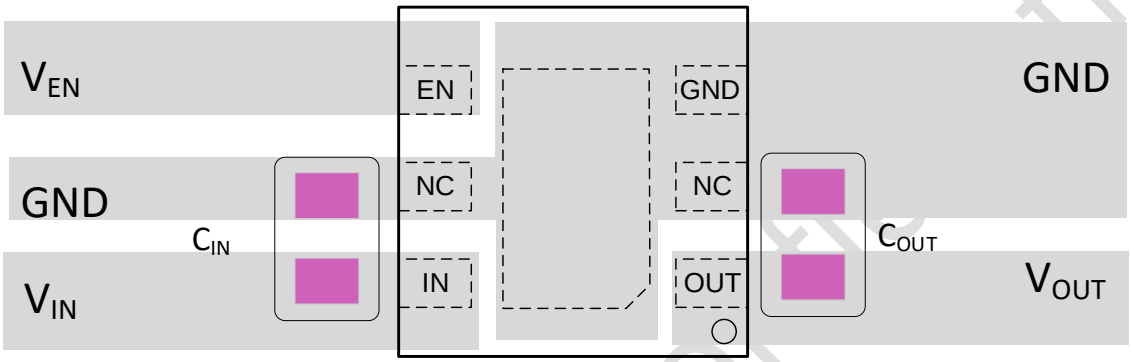
The maximum power dissipation determines the maximum allowable junction temperature (T_J) for the device. Power dissipation and junction temperature are most often related by the junction-to-ambient thermal resistance($R_{\theta JA}$) of the combined PCB and device package and the temperature of the ambient air (T_A), according to

$$T_J = T_A + (\theta_{JA} \times P_D)$$

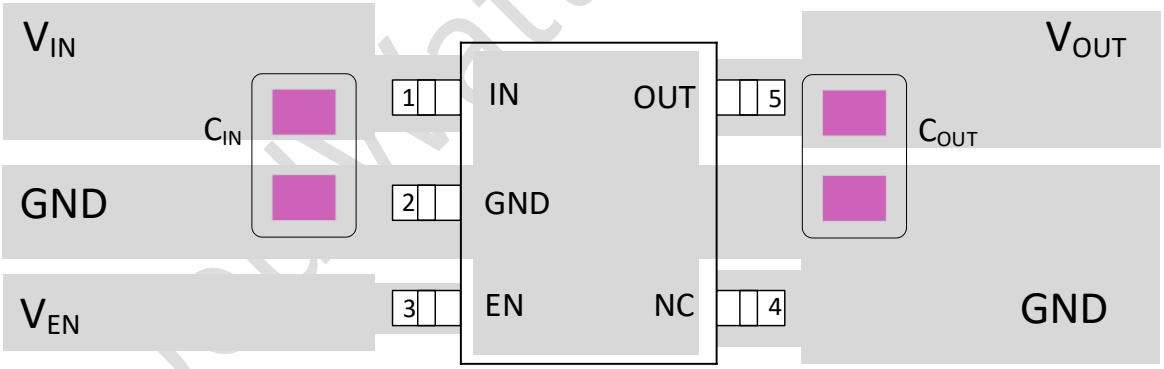
Layout Guidelines

Place all circuit components on the same side of the circuit board and as close to the respective LDO pin as possible. Place ground return connections to the input and output capacitor. Connect the ground plane with a wide copper surface for good thermal dissipation. Using vias and long power traces for the input and output capacitors connections is not recommended and negatively effects system performance.

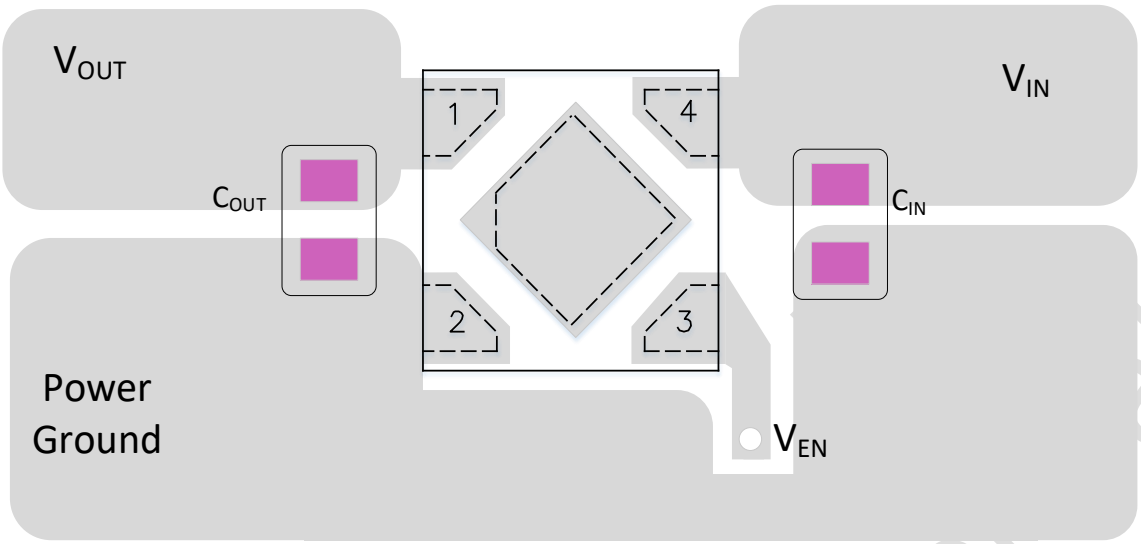
EWDNF2*2-6:



SOT23-5:



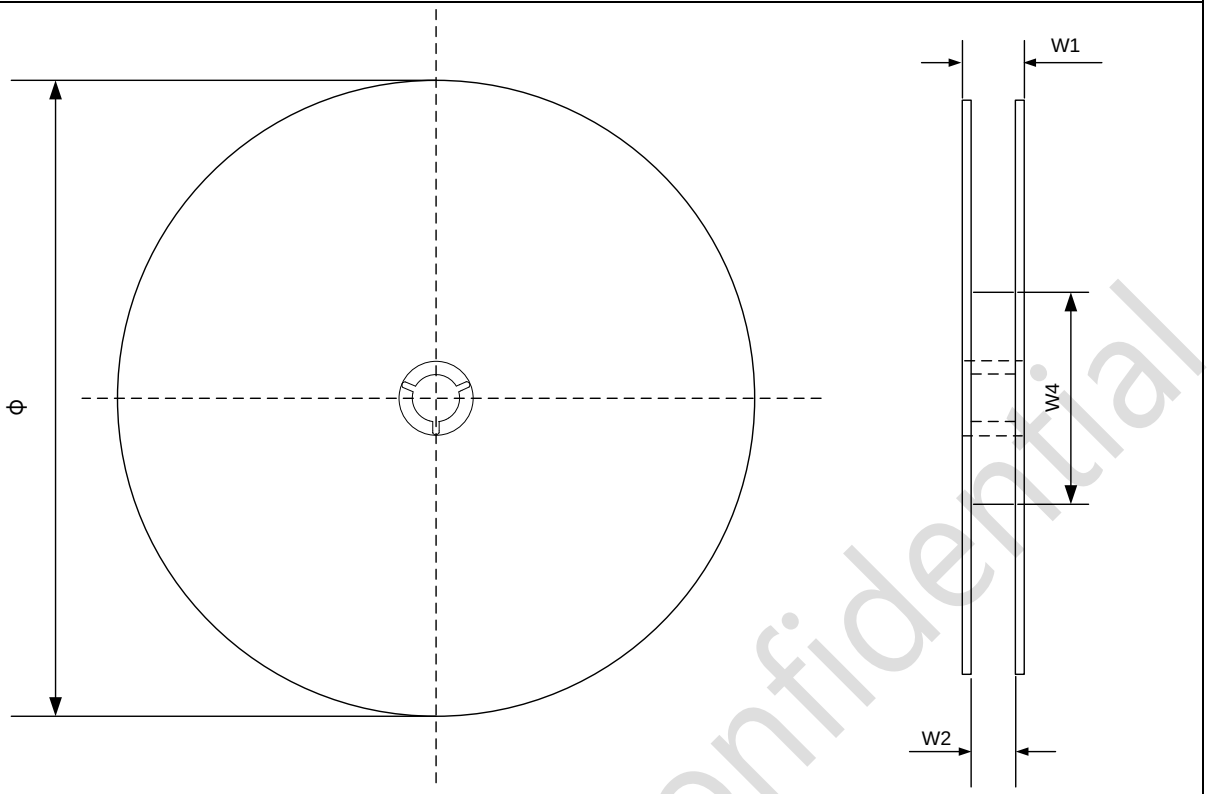
X2DFN1*1-4:



PCB Layout Recommendation

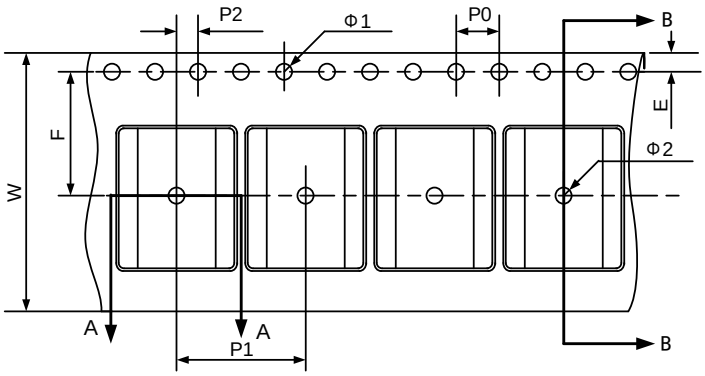
TAPE AND REEL INFORMATION

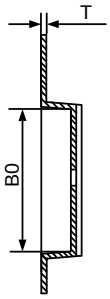
Reel UNIT: mm



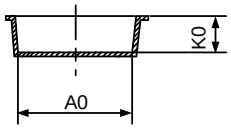
Package	Diameter Φ	Thickness W1	Width W2	W4
SOT23-5	178±2	12.30±2	9.5±2	58±4
EWDFN2*2-6	178±2	12.30±2	9.5±2	58±4
X2DFN1*1-4	178±2	12.30±2	9.5±2	58±4

Carrier Tape UNIT: mm





SECTION B-B



SECTION A-A

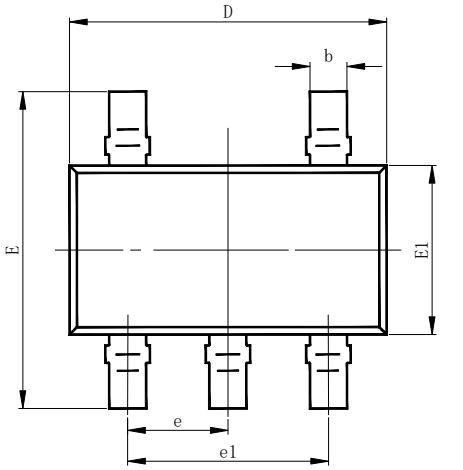
Note:

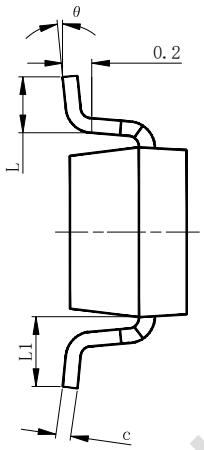
1) The carrier type is black, and colorless transparent.
2) Carrier camber is within 1mm in 100mm.
3) 10 pocket hole pitch cumulative tolerance:±0.20.
4) All dimensions are in mm.

Package	Tape dimensions (mm)											
	P0	P2	P1	A0	B0	W	T	K0	Φ1	Φ2	E	F
SOT23-5	4.0±0.1	2.0±0.1	4.0±0.1	3.23±02	3.13±03	8.0±0.3	0.25±0.2	1.37±02	1.55±0.15	1.00min	1.75±0.1	3.50±0.1
EWDFN2*2-6	4.0±0.1	2.0±0.1	4.0±0.1	2.3±0.2	2.3±0.2	8.0±0.3	0.25±0.2	1.1±035	1.50min	1.00min	1.75±0.1	3.50±0.1
X2DFN1*1-4	4.0±0.1	2.0±0.1	2.0±0.1	1.16±0.1	1.16±0.1	8.0±0.3	0.2±0.1	0.5±0.1	1.5±0.1	0.5±0.1	1.75±0.1	3.50±0.1

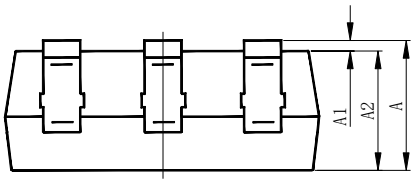
PACKAGE OUTLINE

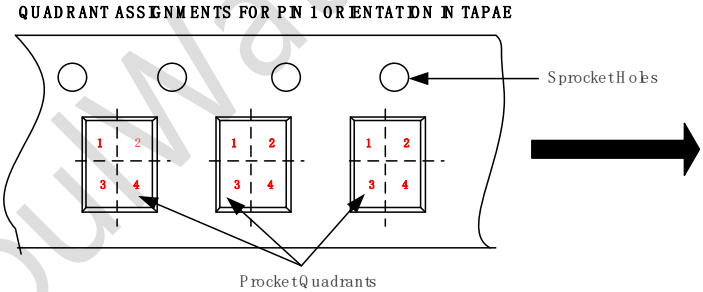
SOT23-5 UNIT: mm





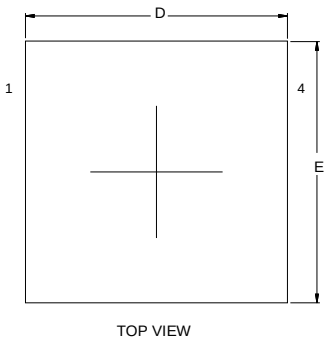
SYMBOL	MILLIMETER		
	MIN	NOM	MAX
A	1.050	1.150	1.250
A1	0.000	0.020	0.050
A2	1.050	1.100	1.150
b	0.300	0.400	0.500
c	0.100	0.150	0.200
D	2.820	2.920	3.020
E1	1.500	1.600	1.700
E	2.650	2.800	2.950
e	0.950(BSC)		
e1	1.800	1.900	2.000
L	0.300	0.450	0.600
L1	0.600REF		
θ	0°	4°	8°



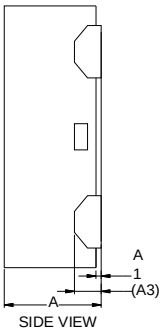


Package Type	Pin1 Quadrant
SOT23-5	3

X2DFN1*1-4 UNIT: mm

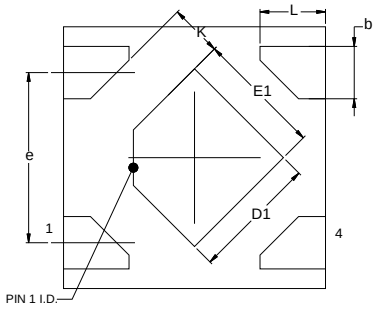


TOP VIEW



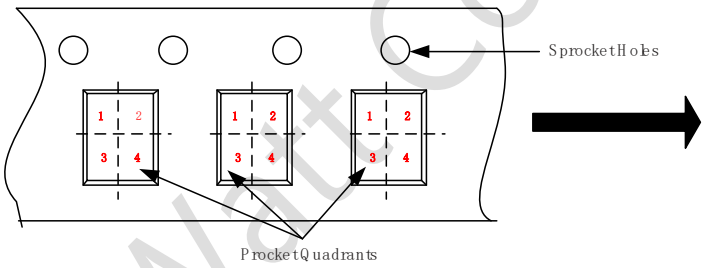
SIDE VIEW

SYMBOL	MILLIMETER		
	MIN	NOM	MAX
A	0.32	0.37	0.40
A1	0.00	0.02	0.05
A3		0.102 REF	
b	0.15	0.20	0.25
D	0.90	1.00	1.10
E	0.90	1.00	1.10
e		0.65 BSC	
D1	0.38	0.48	0.58
E1	0.38	0.48	0.58
L	0.15	0.25	0.35
K		0.200 REF	



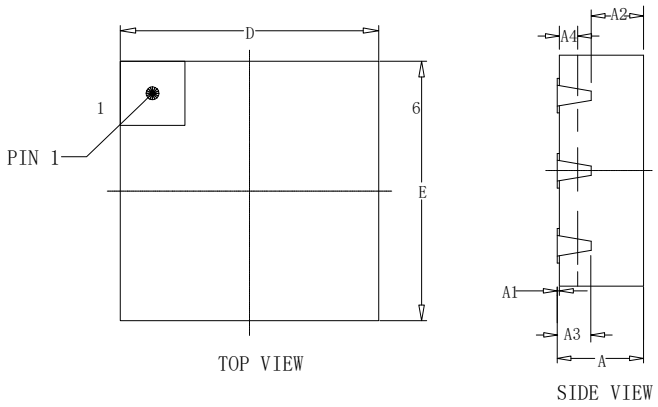
BOTTOM VIEW

QUADRANT ASSIGNMENTS FOR PIN 1 ORIENTATION IN TAPE

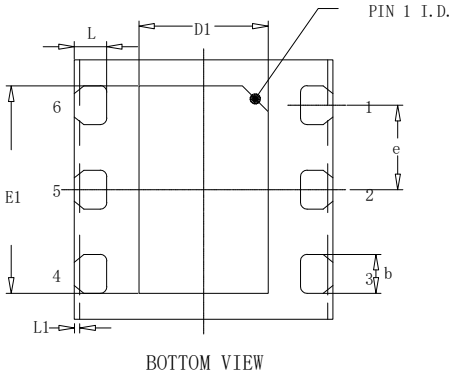


Package Type	Pin1 Quadrant
X2DFN1*1-4	1

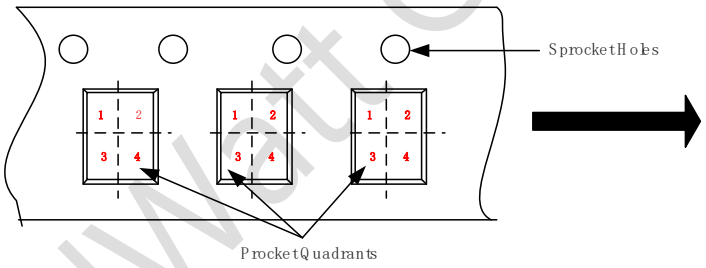
EWDFN2*2-6 UNIT: mm



SYMBOL	MILLIMETER		
	MIN	NOM	MAX
A	0.70	0.75	0.80
A1	0.00	0.02	0.05
A2	---	0.55	---
A3		0.203 REF	
A4	0.075	---	0.18
b	0.25	0.30	0.35
D	1.90	2.00	2.10
E	1.90	2.00	2.10
D1	0.90	1.00	1.10
E1	1.50	1.60	1.70
e		0.65 BSC	
L	0.20	0.25	0.30
L1	0.01	---	0.09



QUADRANT ASSIGNMENTS FOR PIN 1 ORIENTATION IN TAPE



Package Type	Pin1 Quadrant
EWDFN2*2-6	2

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